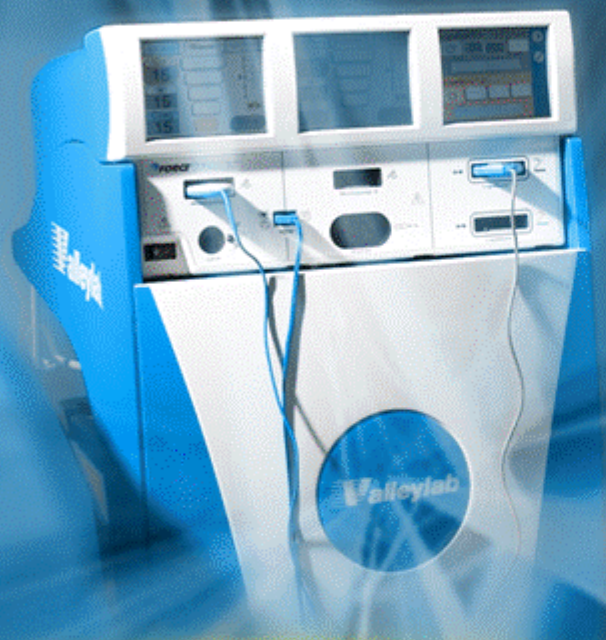
FORCE TRIAD™
with TissueFect Sensing Technology



In-Servicing Program

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System Description

• The **ForceTriad™** energy platform is a combination of a full-featured general surgery Electrosurgical Unit (ESU) and a LigaSure™ tissue fusion system.

• This RF energy platform provides a range of options that deliver precise control and enhanced tissue effect. This product provides clinicians advanced electrosurgical tissue effect with improved LigaSure™ tissue fusion capabilities in one state-of-the-art, intuitive and aesthetically pleasing system. This product redefines conventional electrosurgery.

• The ESU section of the ForceTriad™ energy platform is capable of performing every surgical procedure currently supported by the Force™ FX generator. This includes both **Monopolar** and **Bipolar** procedures.

• The LigaSure™ tissue fusion system section of the unit supports all existing LigaSure™ instruments

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Back Panel

1. Starting on the left side of the panel there are two network ports which can be used to connect to the internet

2. There is also an RS232 interface

3. There are two LigaSure™ footswitch receptacles

    a. It is important to notice that the **purple** ringed receptacle goes with the seven pin purple LigaSure™ foot pedal

    b. The **orange** ringed receptacle goes with the nine pin orange LigaSure™ foot pedal

4. There is a three pin bipolar footswitch receptacle, as on most electrosurgical generators

5. There is a six pin two-pedal monopolar footswitch receptacle, as on most electrosurgical generators

6. To the far right of the generator is the main power connector

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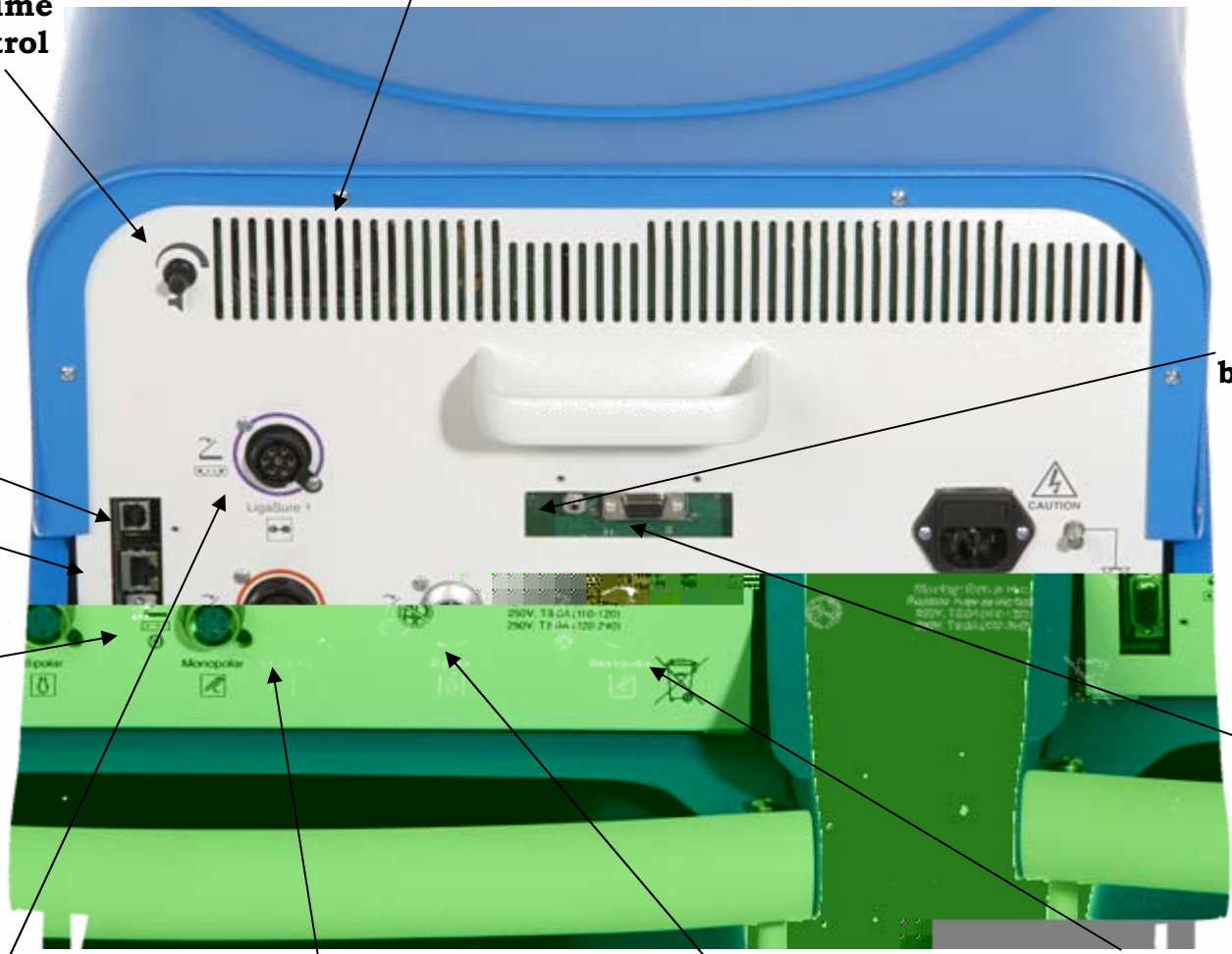
Back Panel Layout



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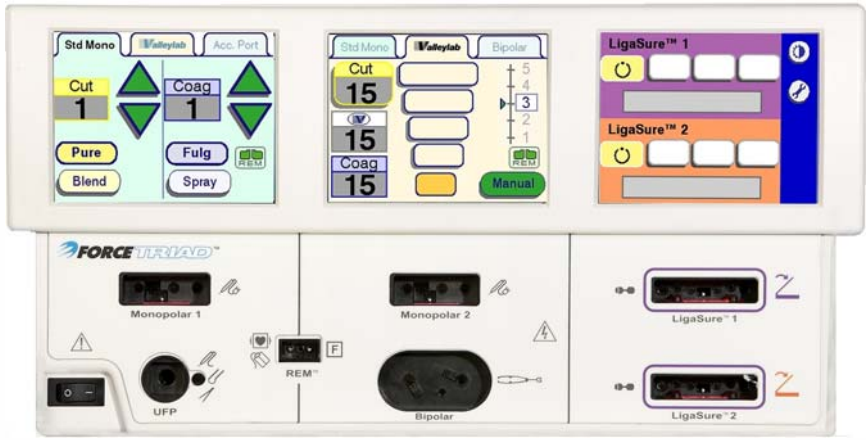
Front Panel



Receptacles

1. At the bottom left is the ForceTriad™ energy platform (turn on and as it warms up move through the receptacles)

2. What is important to remember is that each of the instrument receptacles corresponds with the touchscreen in which they are aligned. The receptacles will also recognize what kind of instrument is plugged in and will project the appropriate screen.

3. Monopolar 1 is for an electrosurgical pencil or a Valleylab Force TriVerse™ electrosurgical device. Only one monopolar instrument may be connected at a time under this touchscreen

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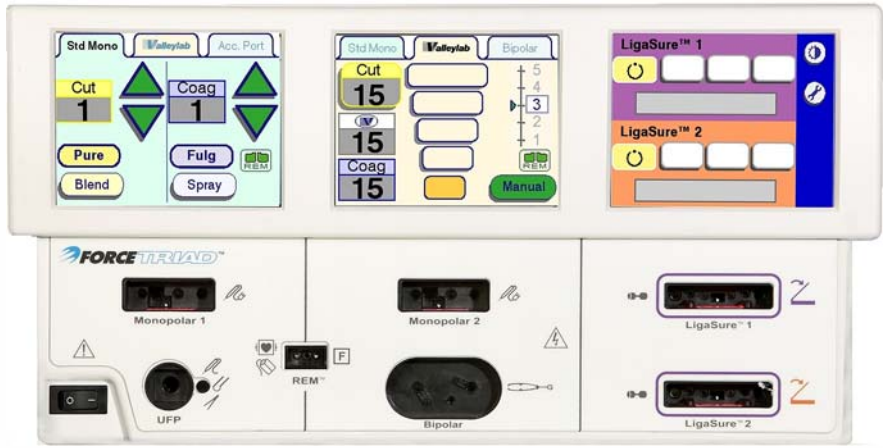
Front Panel



Receptacles

4. The Universal Footswitching Accessory Receptacle is a connector for a single pin electrosurgical instrument. This has traditionally been an additional receptacle that needed to be plugged into an electrosurgical unit, which has now been incorporated in the ForceTriad™ energy platform

5. REM™ Patient Return Electrode Receptacle that is the connector for the REM™ patient return electrode plug. It is important to remember that the ForceTriad™ energy platform will only function with a contact quality electrode.

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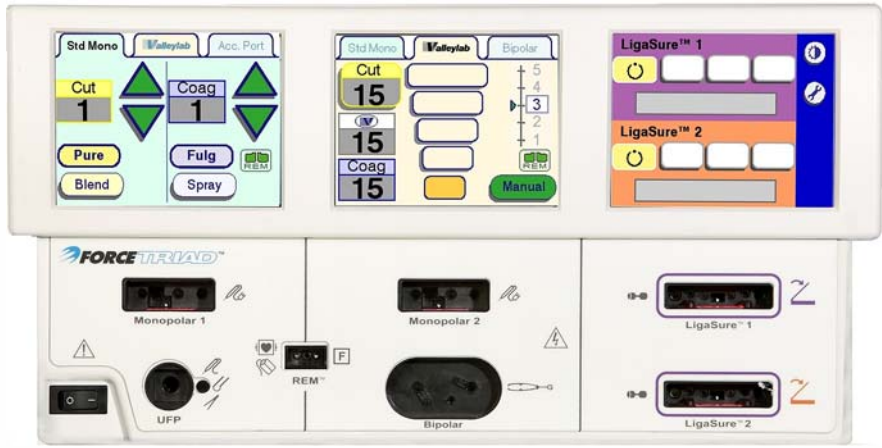
Front Panel



Receptacles

6. Monopolar 2 is for an electrosurgical pencil or a Valleylab Force TriVerse™ electrosurgical device. Only one monopolar instrument may be connected at a time under this touchscreen.

7. The Bipolar instrument Receptacle is the connector for a traditional bipolar instrument

8. There are also two LigaSure™ instrument receptacles. It is important to remember that all LigaSure™ instruments have been optimized for two bars and when properly plugged in, the generator will recognize the LigaSure™ instrument and set itself to two bars

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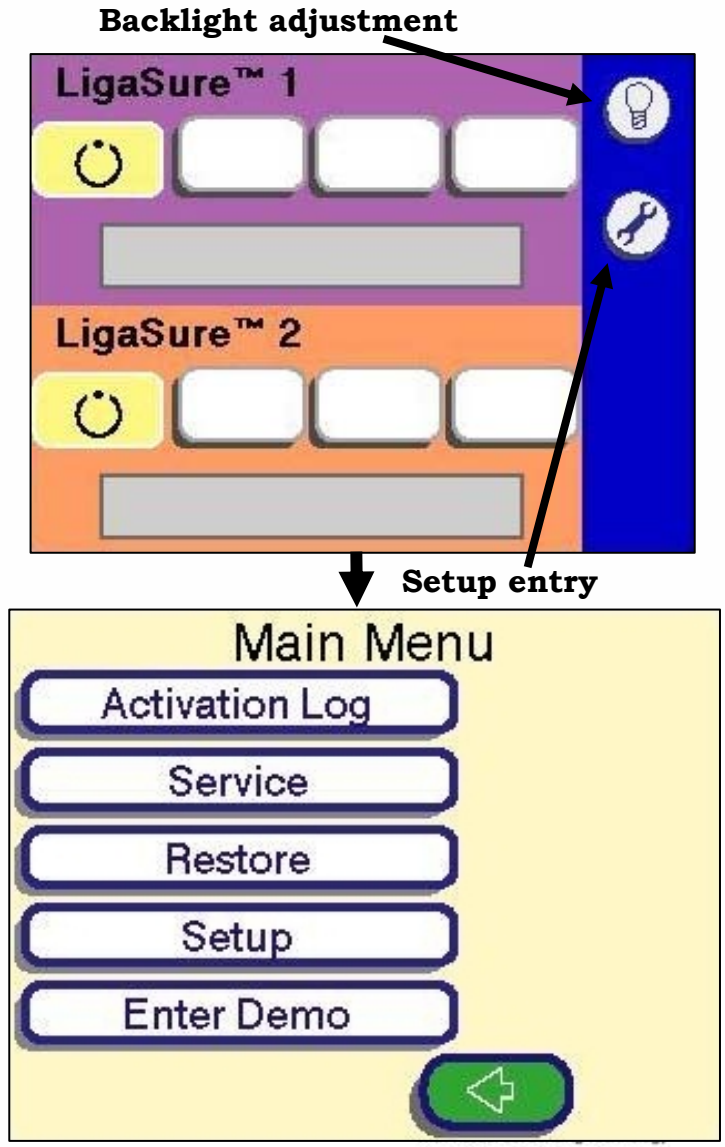
System Operation System Setup

- Backlight
  - 3 different settings
- Setup Screen Main Menu
  - Activation log - last 1K events
  - Service – maintenance and calibration
  - Restore – last settings
  - Setup – language, date & time
  - Demo Mode



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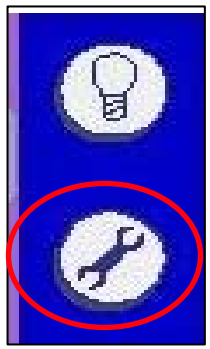
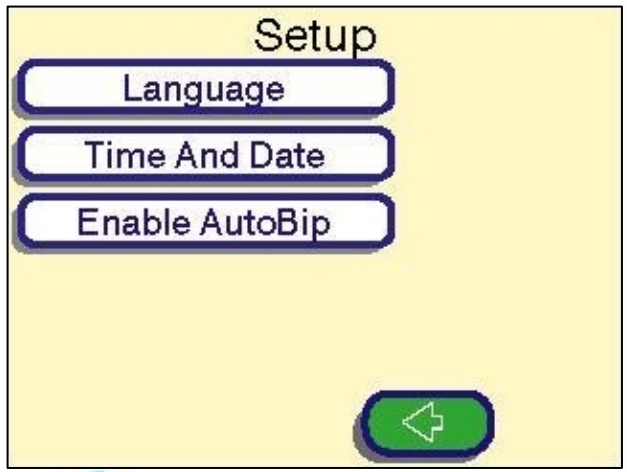
System Setup

Touching the wrench icon on the right side of the right screen, and then touching the **Setup** button in the Main Menu displays the **Setup Menu**.



The Languages displayed on the screens, the Time and Date, and the Autobipolar mode are set using the **Setup** Menu.



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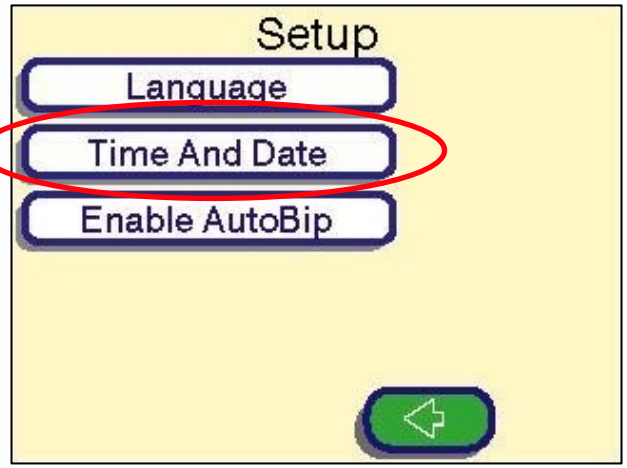
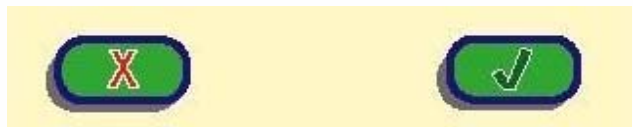
To set the Time and Date:

- Touch the **Time and Date** button.



- Touch the desired numeric box (hours, minutes, seconds, day, or year).
- Touch the up or down arrows to the right to increase or decrease the displayed number (holding the buttons down will cause the numbers to change more quickly).
- Touch the **green** ☑ or the **Red** ☒ to confirm or reject the time and date settings.



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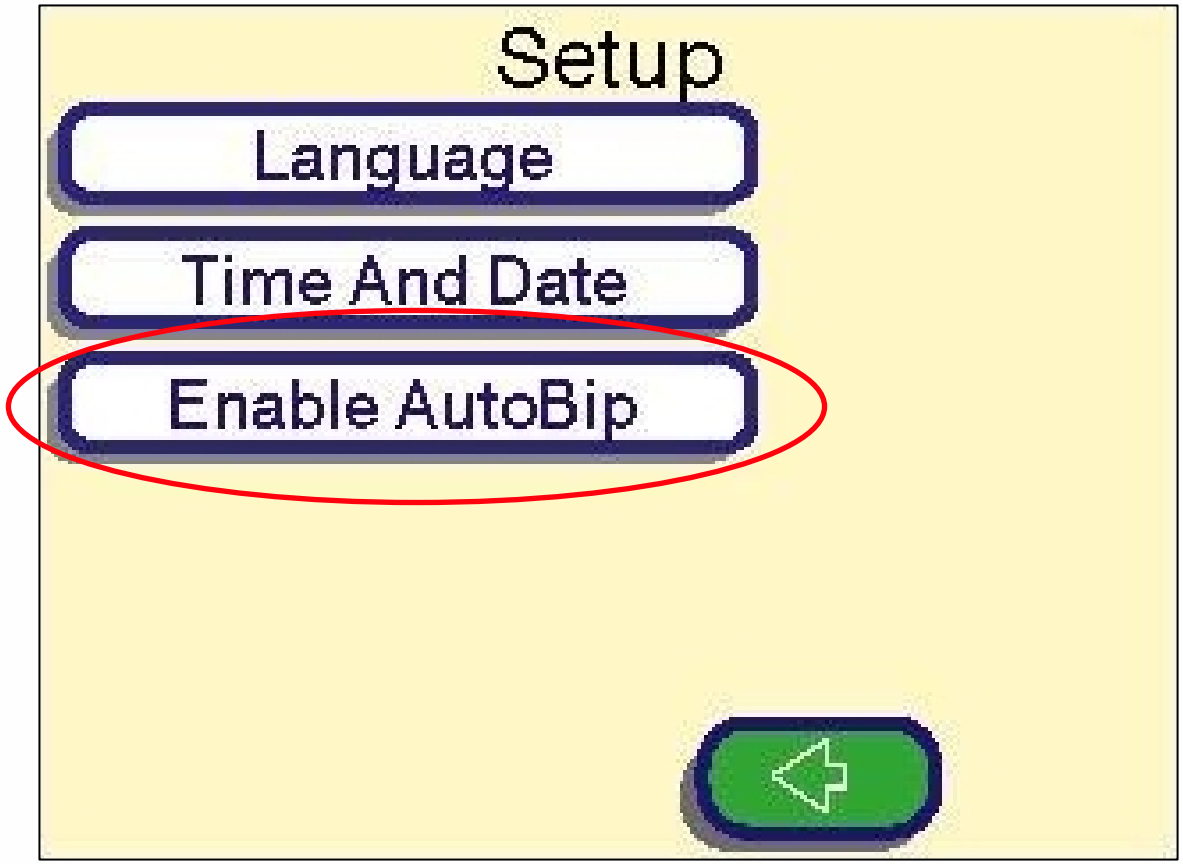
To enable/disable Autobipolar mode:

- Touch the **Enable Autobipolar** or **Disable Autobipolar** toggle button to enable or disable the Autobipolar mode.



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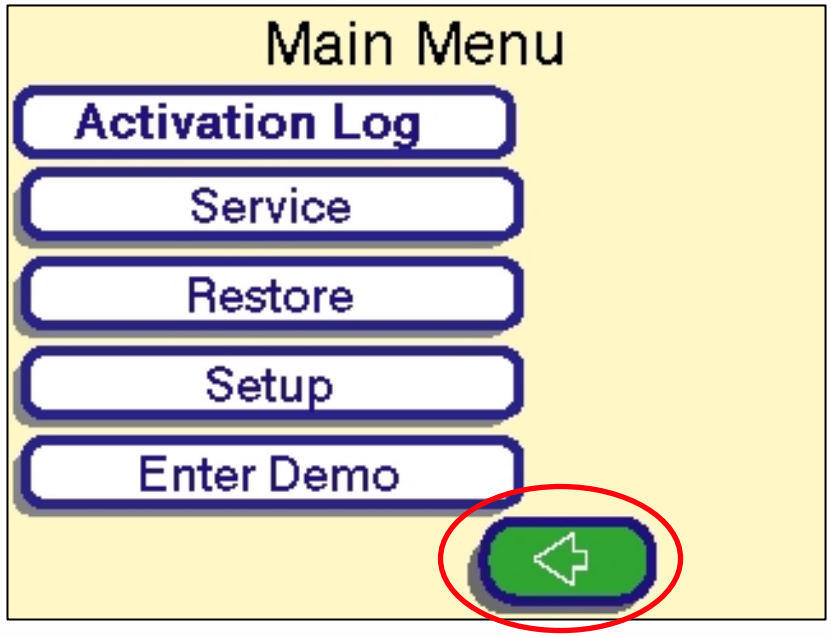
Touching the **green arrow** in the **Setup Menu** and then the **green arrow** in the **Main Menu** will return to the main display.



Other System Functions

- Other system-level functions can be accessed through the **Main Menu**.The **Main Menu** is displayed by touching the wrench icon on the right side of the right screen.

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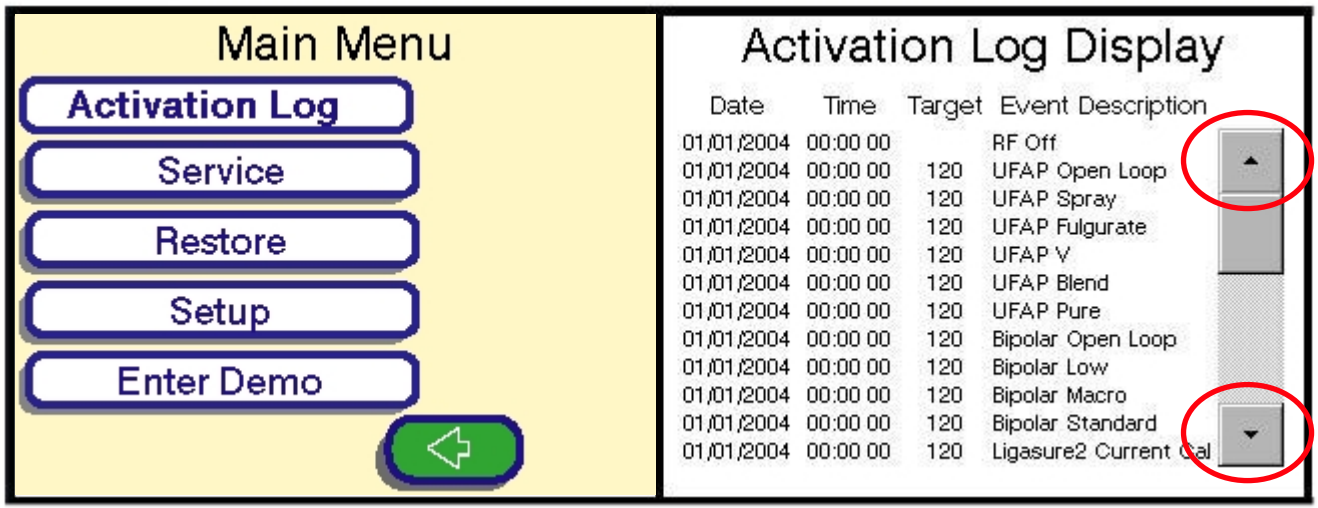
System Operation System Setup

Activation Log:

- The activation log allows viewing of the last 1000 activations and REM™ alerts.
- Touch **Activation Log** in the **Main Menu** to display the log.
- Touch the single up or down arrow buttons to scroll through the log one item at a time.


Main Menu
Activation Log
Service
Restore
Setup
Enter Demo
Activation Log Display
Date Time Target Event Description
01/01/2004 00:00 00 RF Off
01/01/2004 00:00 00 120 UFAP Open Loop
01/01/2004 00:00 00 120 UFAP Spray
01/01/2004 00:00 00 120 UFAP Fulgurate
01/01/2004 00:00 00 120 UFAP V
01/01/2004 00:00 00 120 UFAP Blend
01/01/2004 00:00 00 120 UFAP Pure
01/01/2004 00:00 00 120 Bipolar Open Loop
01/01/2004 00:00 00 120 Bipolar Low
01/01/2004 00:00 00 120 Bipolar Macro
01/01/2004 00:00 00 120 Bipolar Standard
01/01/2004 00:00 00 120 Ligasure2 Current Cal

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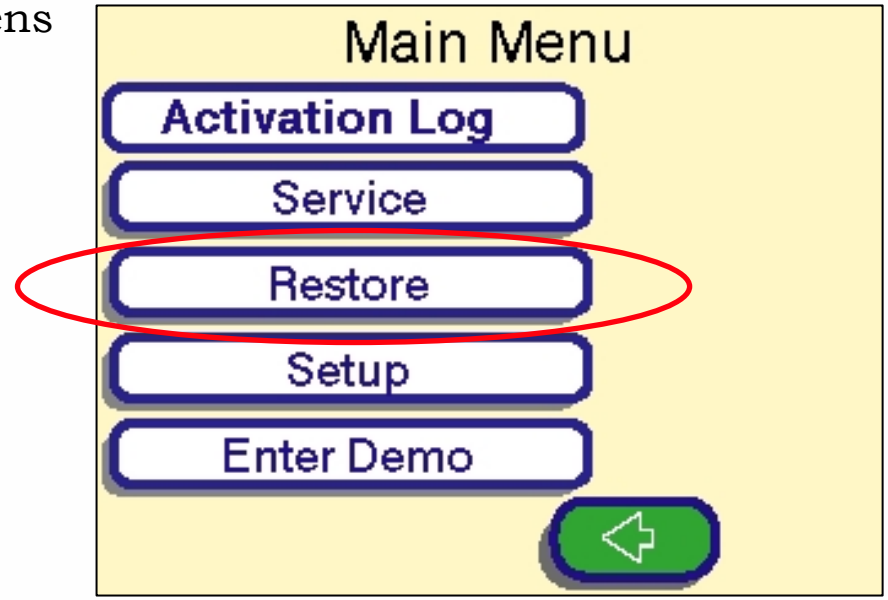
Restore:

• Touch **Restore** in the **Main Menu** to restore the energy platform to the last settings entered prior to shutting the system off.

•Restore

- •Last known settings before power cycle
- •All 2-Button screens
- •3-Button screens
- •Acc Port screen
- •Bipolar screen
- •LigaSure™ screen



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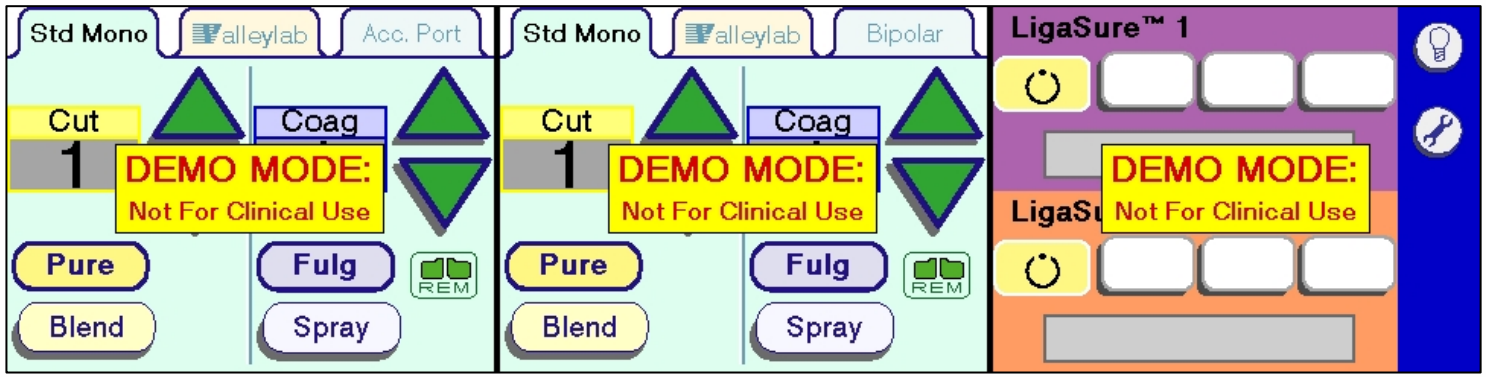
Demo Mode:

- Touch **Demo Mode** in the **Main Menu** to use the energy platform in demo mode. A message displays in all three screens, **"DEMO MODE: Not for Clinical Use."**
- While in Demo Mode, the REM™ alarm is deactivated.
- To exit Demo Mode, either touch **Exit Demo Mode** in the **Main Menu** or turn the energy platform off and restart it.



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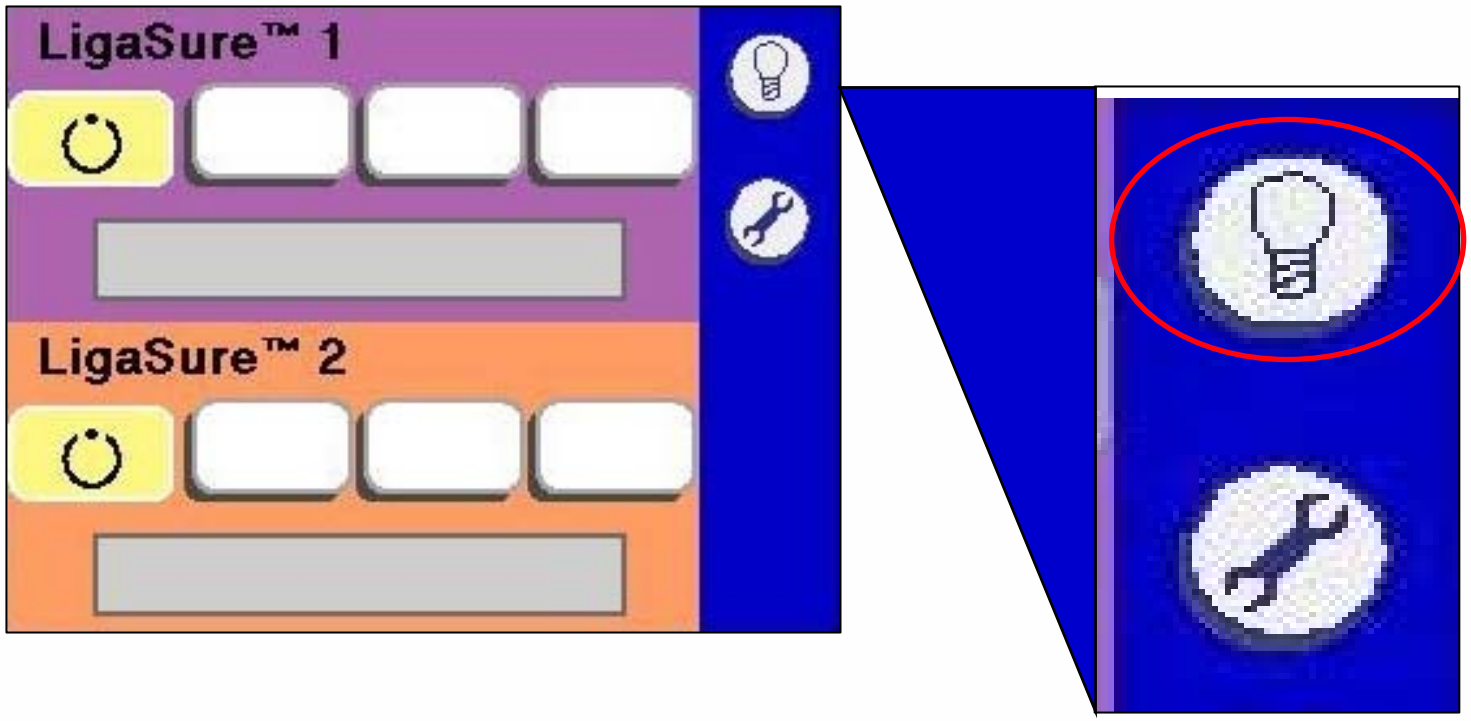
Display Brightness:

- Touch the light bulb icon on the right side of the right screen to change between two levels of display brightness.



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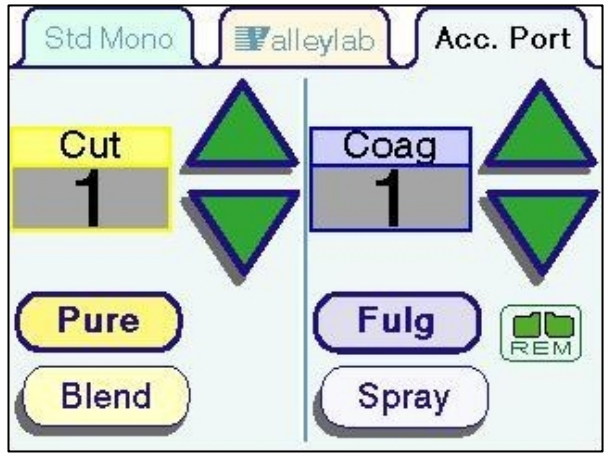
The first screen has three different tabs that can appear:

Monopolar/Accessory Touchscreen



Std Mono tab –

This screen will be displayed when a 2-button instrument or any instrument without a barcode is inserted into the Monopolar 1 receptacle.

Valleylab tab –

This screen will be displayed when a 3-button Valleylab specialty instrument is inserted into the Monopolar receptacle.

Acc. Port tab –

This screen will be displayed when an instrument is inserted into the Universal Footswitching Receptacle (UFP).

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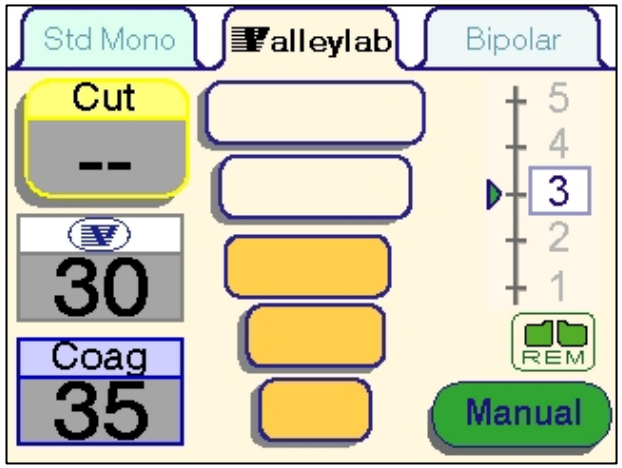
The middle screen (Bipolar Touchscreen) has three different tabs that can appear:

Monopolar/Bipolar Touchscreen



Std Mono tab –

This screen will be displayed when a 2-button instrument or any instrument without a barcode is inserted into the Monopolar 2 receptacle.

Valleylab tab –

This screen will be displayed when a 3-button Valleylab specialty instrument is inserted into the Monopolar 2 receptacle.

Bipolar tab –

This screen will be displayed when a bipolar instrument is inserted into the Bipolar receptacle.

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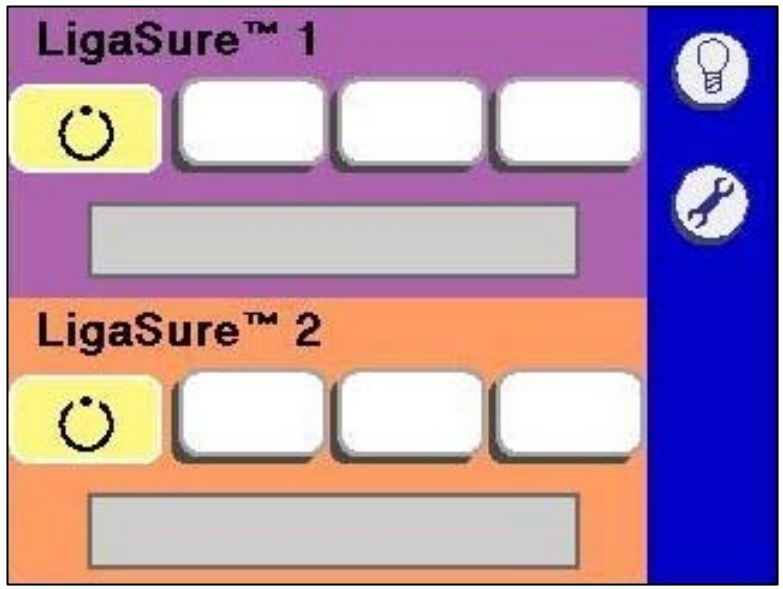
The third screen (LigaSure™) has only one tab that will appear:

LigaSure™ Touchscreen

This screen will be displayed when a LigaSure™ instrument is inserted into either the LigaSure™ 1 or LigaSure™ 2 receptacle.



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Patient Return Electrode

During monopolar electrosurgery, a patient return electrode is always required to safely recover the current that flows through the patient's body and return it to the energy platform.

Step 1

Connect the REM™ patient return electrode plug to the patient return electrode receptacle on the front panel of the energy platform.

- flashing red and yellow when an alarm condition occurs

Step 2

Place the patient return electrode on the patient. Refer to instructions for the electrode to ensure proper placement. The REM™ indicator on the screen illuminates:

- **red** when disconnected, incorrectly placed, or the patient requires two pads

- **green** when properly connected to the energy platform and the patient

Note: The ForceTriad™ energy platform will only operate with a contact quality monitoring return electrode.

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Footswitch Connection

When using Valleylab footswitching electrosurgical instruments, plug the footswitch cable into the corresponding footswitch receptacle on the back panel of the energy platform.

- Monopolar footswitch (two-pedal)
- Bipolar footswitch (three-pin, single-pedal)
- LigaSure™ footswitches (seven-pin, single-pedal or nine-pin, single-pedal)

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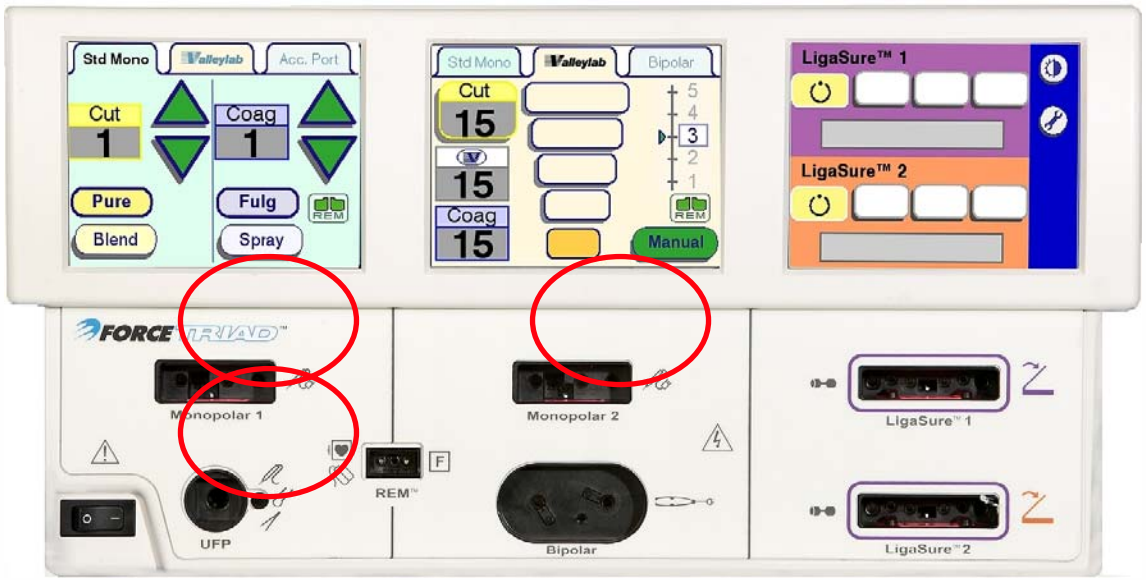
Instrument Connection

Connect a two-button or three-button monopolar instrument to the Monopolar 1 or Monopolar 2 receptacle on the front panel of the ForceTriad™ system.

OR

Connect a single-pin electrosurgical instrument footswitch to the Universal Footswitching Accessory Receptacle on the front panel of the ForceTriad™ system.



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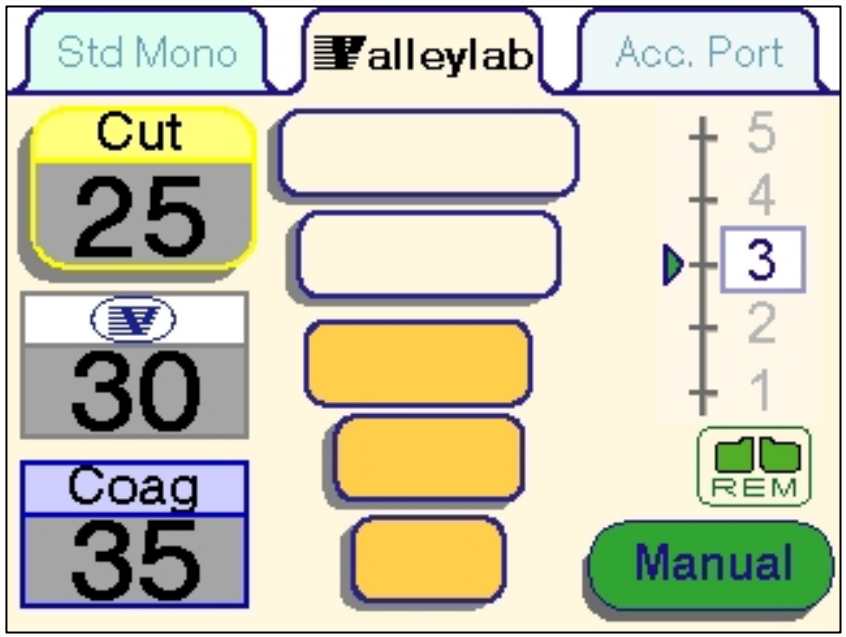
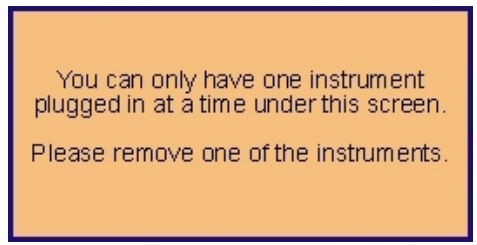
Instrument Recognition

The ForceTriad™ energy platform will detect the instrument type and automatically display the applicable screen tab on the corresponding touchscreen.



NOTE:
Only one instrument at a time can be inserted into the receptacle beneath either the Monopolar 1 or Monopolar 2 touchscreens. Otherwise the user will receive a dual instrument alarm.



If two instruments are activated simultaneously, the energy platform will deliver power only to the instrument detected first. The second and subsequent activations will be ignored until the first instrument is no longer activated.

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Std Mono Touchscreen:

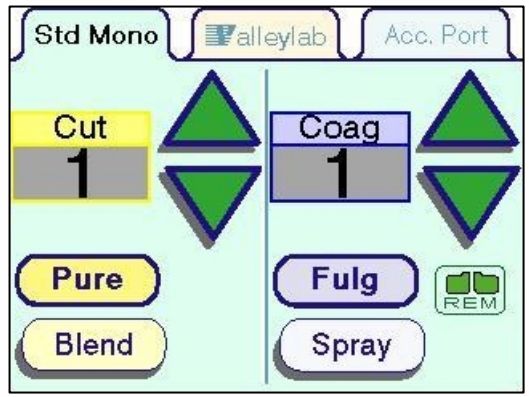
The Standard Monopolar tab allows the user to control the power mode and power output level at the ForceTriad™ energy platform interface.

Power Mode:

Select the power output mode by touching the associated button at the bottom of the tab. The power output level in watts is displayed in the **Cut** or **Coag** boxes.

- **Pure** (Cut)
- **Blend** (Cut)

- **Fulg** (Coag)
- **Spray** (Coag)



Power Output Level:

The power output level can be further adjusted by touching the green up and down arrows for either the **Cut** or **Coag** mode.

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Using Instrument Buttons:

The electrosurgical instrument can be activated as follows:

•**Cut** (Pure or Blend) – press the yellow button on the instrument. The **Cut** box on the screen will illuminate yellow and a tone will sound for as long as the instrument is activated.

•**Coag** (Fulg or Spray) – press the blue button on the instrument. The **Coag** box on the screen will illuminate blue and a tone will sound for as long as the instrument is activated.

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TissueFect™ Sensing Technology:

A Valleylab control system designed to precisely manage energy delivery, creating a range of options for desired tissue effect.

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TissueFect™ Sensing Technology

- Proactive, real time
- Forward-looking approach
  - Actively looks at tissue and instantly responds
  - Energy decisions made in real-time
  - Decisions 4000 times per second
    - 20 X faster
  - Controls what is happening or going to happen
  - No need for retroactive analysis

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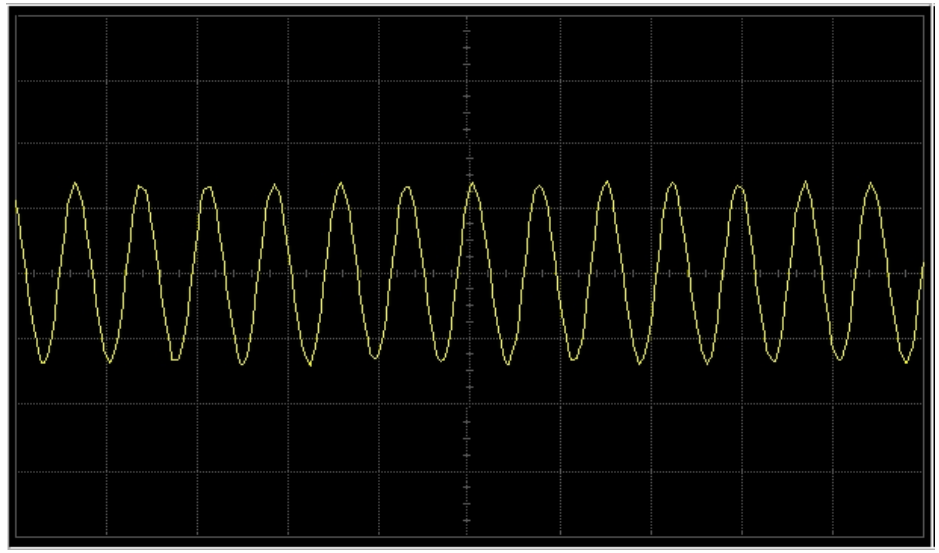
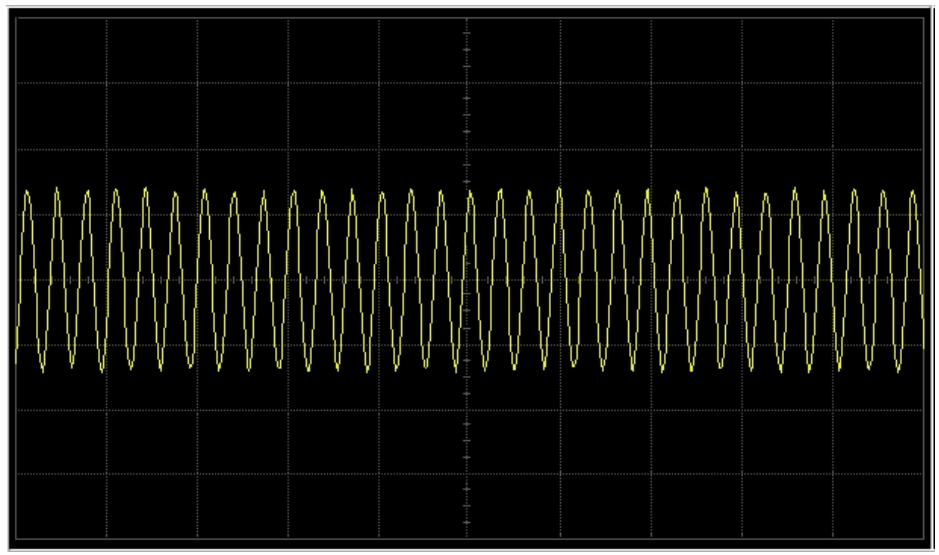
Pure Cut

- Force FX™-C generator
  - Pure Cut



- ForceTriad™ energy platform
  - Pure Cut



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Pure Cut Mode Comparison

	ForceTriad™ Energy Platform Pure Cut	Force FX™-C Generator Pure Cut	Force™ 2 Generator Pure Cut
Duty cycle	**100%**	100%	100%
Frequency	**472 kHz**	390 kHz	510 kHz
TissueFect™ sensing technolgy	**Yes**	No	No
Flat power curve	**Yes**	Yes	No
Power Efficiency Rating	**99**	98	78

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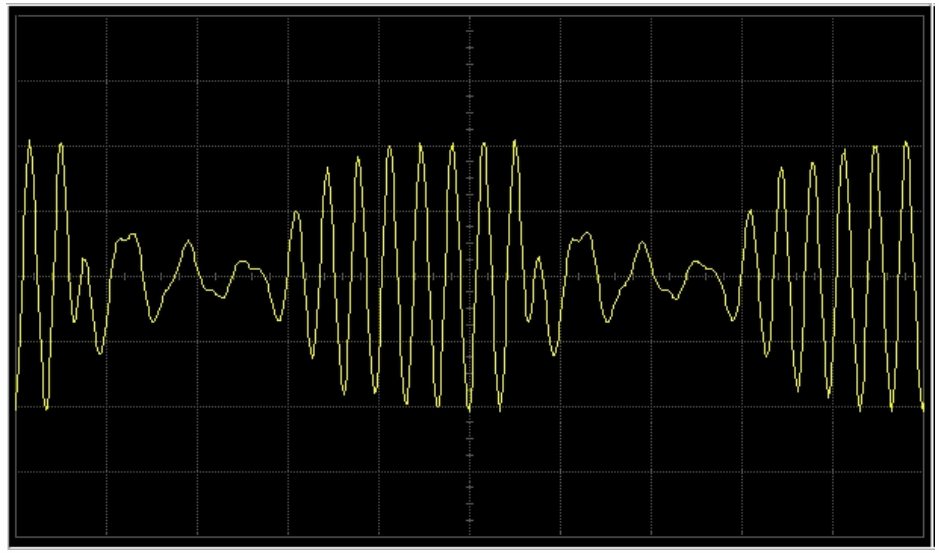
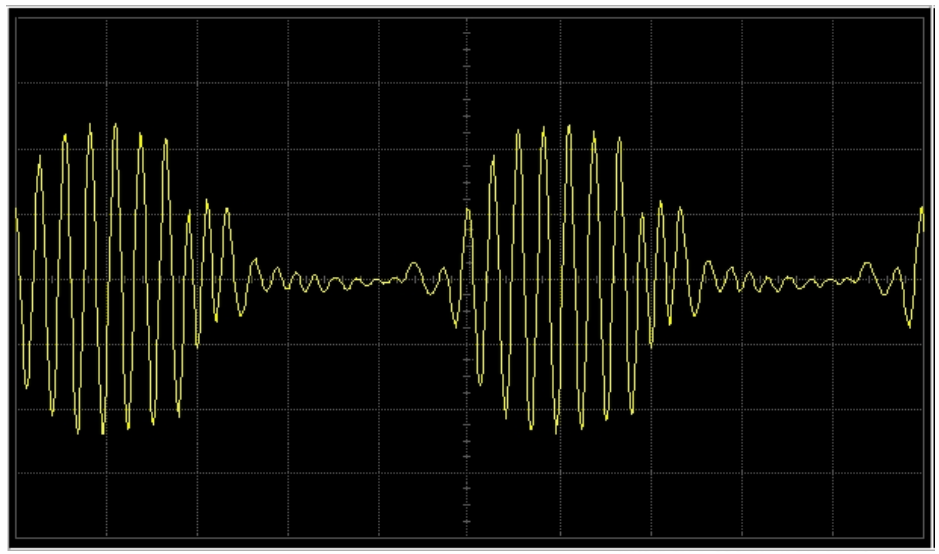
Blend Cut

- Force FX™-C generator
  - Substantial "ring"



- ForceTriad™ energy platform
  - Little "ring"



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Blend Mode Comparison

	ForceTriad™ Energy Platform Blend	Force FX™-C Generator Blend	Force™ 2 Generator Blend 1
Duty cycle	**50%**	50%	50%
Frequency	**472 kHz**	390 kHz	510 kHz
TissueFect™ sensing technology	**Yes**	No	No
Flat power curve	**Yes**	Yes	No
Power Efficiency Rating	**99**	98	78

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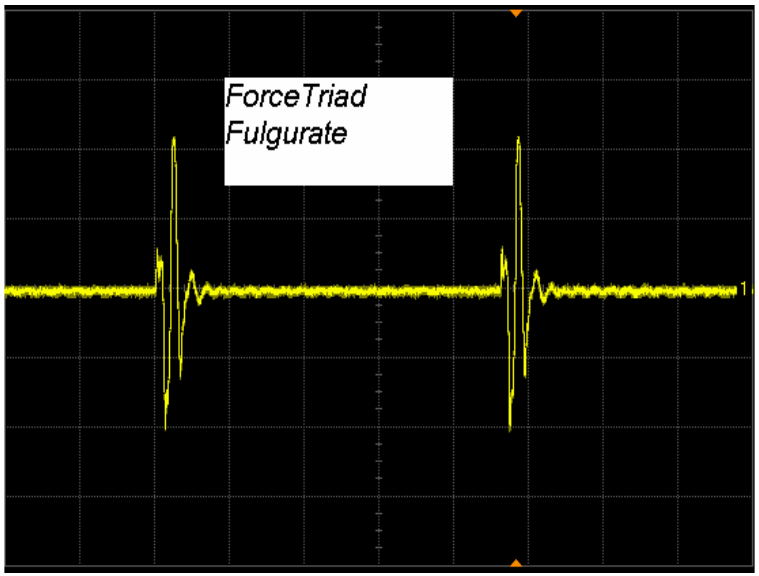
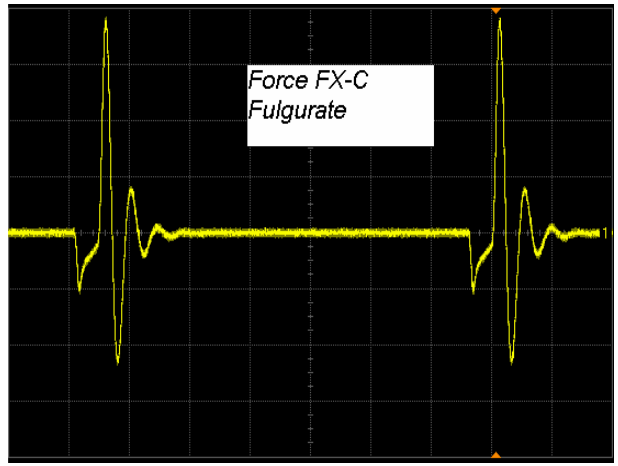
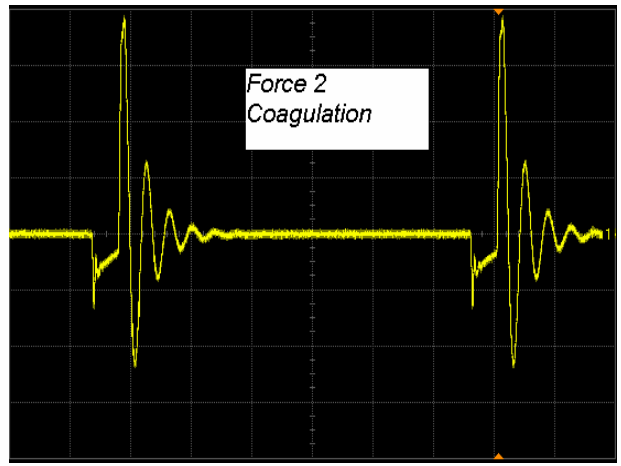
Fulgurate Mode Waveforms







FORCE TRIAD™ with TissueFect Sensing Technology

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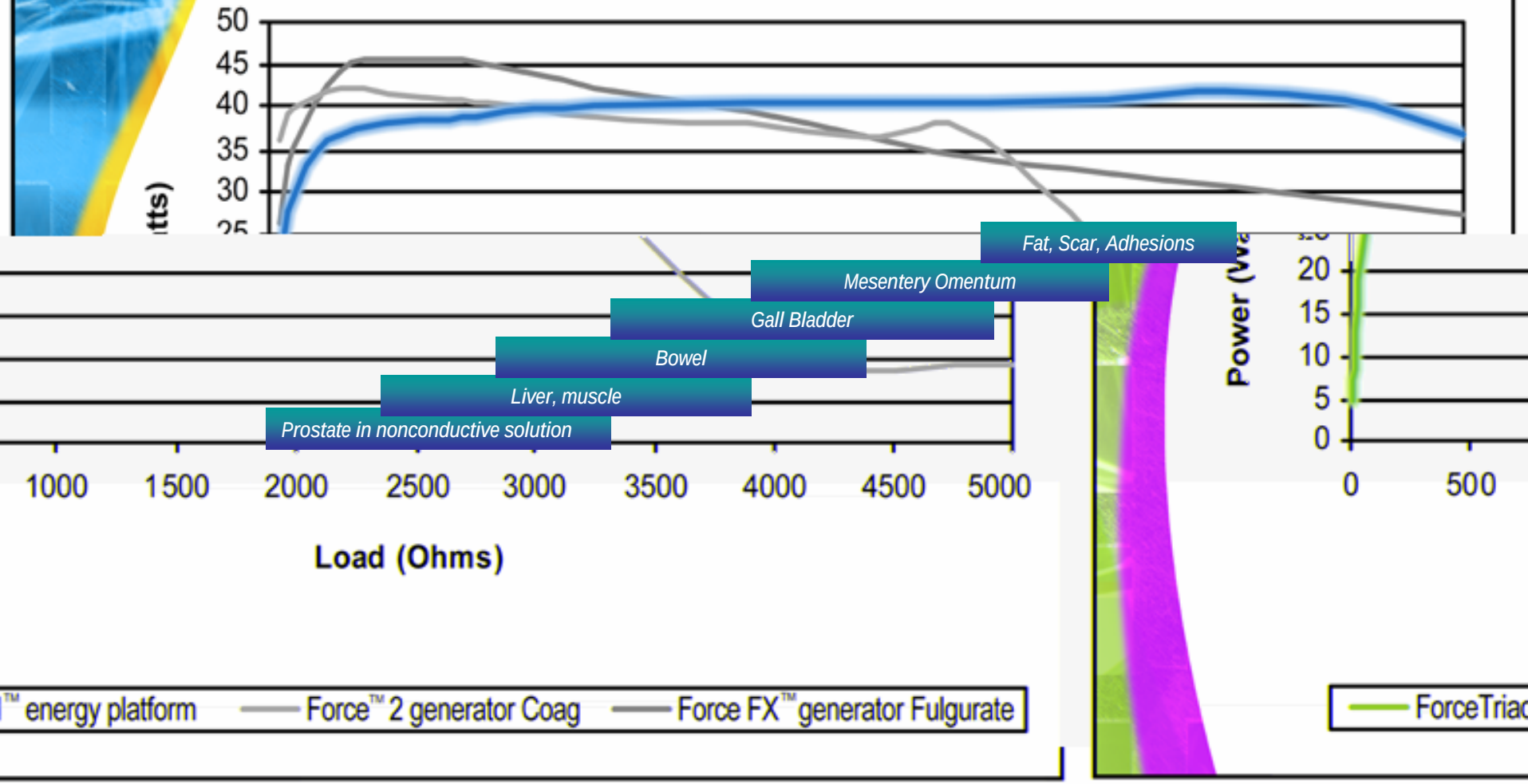
Fulgurate Mode

ForceTriad™ energy platform vs. Force™ 2 and Force FX™ C generators at 40 watts



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Fulgurate Mode Comparison

	ForceTriad™ Energy Platform Coag	Force FX™-C Generator Coag	Force™ 2 Generator Coag
Duty cycle	**6.5%**	7.6% or 14.6%	6.5%
Frequency	**473 kHz**	390 kHz	510 kHz
TissueFect™ sensing technology	**Yes**	No	No
Flat power curve	**Yes**	No	No
Power efficiency rating	**95**	N/A	N/A

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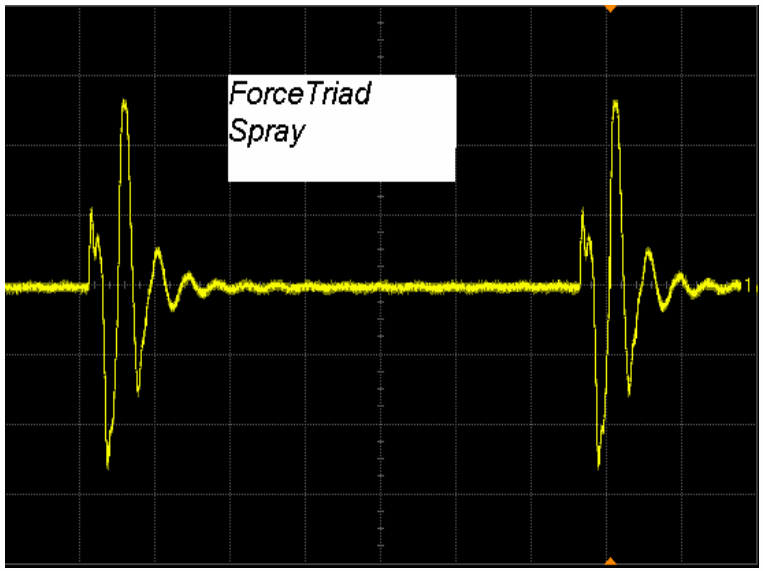
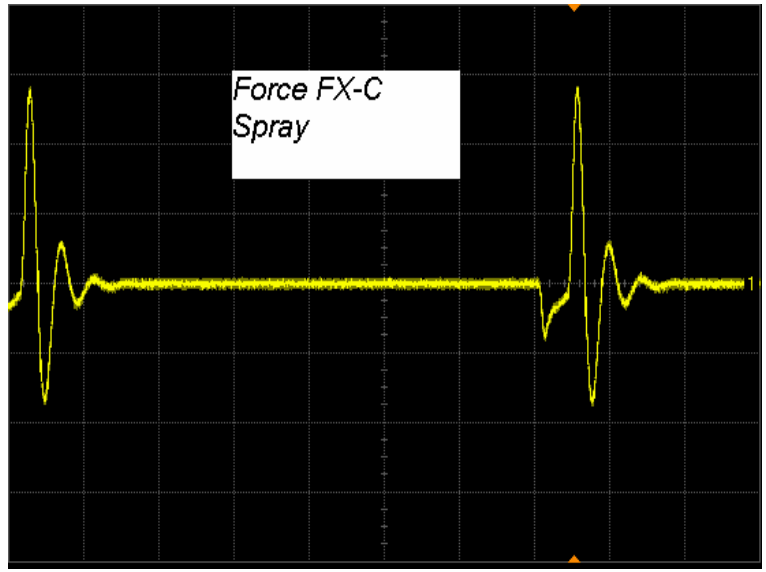
Spray Mode Waveforms





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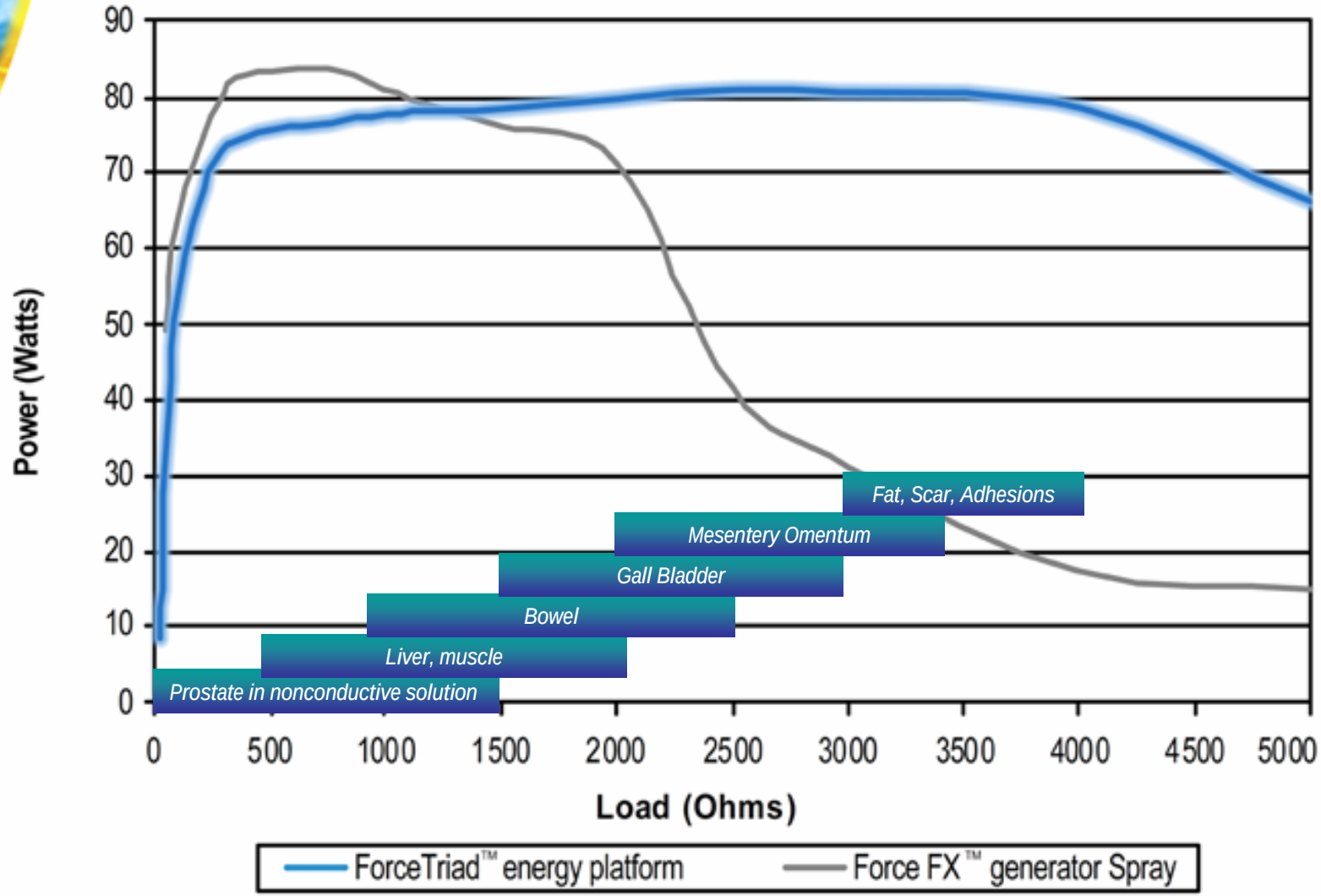
Spray Mode

ForceTriad™ energy platform vs. Force FX™ C generator at 80 watts



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Spray Mode Comparison

	ForceTriad™ Energy Platform Spray	Force FX™-C Generator Spray	Force™ 2 Generator
Duty cycle	**4.6%**	Variable with 7.2% center	N/A
Frequency	**473 kHz**	470 +/- 40 kHz	N/A
TissueFect™	**Yes**	No	N/A
Flat power curve	**Yes**	No	N/A
Power Efficiency Rating	**95**	N/A	N/A

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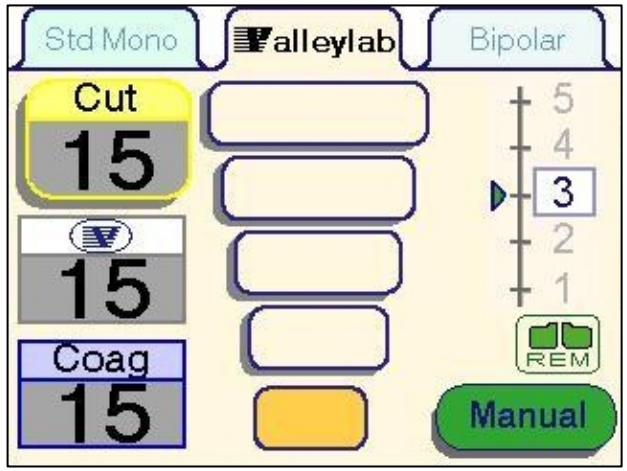
Using Valleylab Instruments

Valleylab Touchscreen:

The Valleylab tab allows the user to control energy output by adjusting the power zones at the ForceTriad™ energy platform interface.



Power Zone:

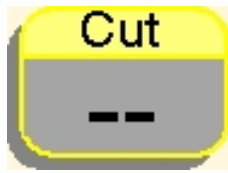
The five gold bars in the center of the **Valleylab** tab represent the five power range zones available for the Valleylab electrosurgical instrument attached to the energy platform.

Touch one of the five gold bars to select the desired power zone. The selected bar and all of the bars below it will illuminate gold and a brief double tone will sound. Each of the five bars, when activated, changes the power output level for each of the three surgical modes.

- **Cut**
- **Valleylab™ Mode**
- **Coag**

Note:

Cut mode can be disabled, as a safety feature, by touching the yellow **Cut** mode display box. It can be enabled in the same manner.



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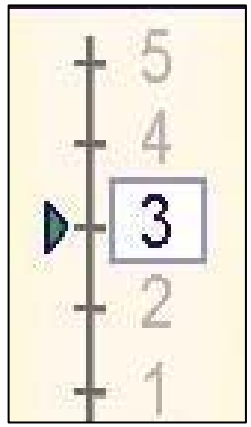
Power Output Level:

The power output level can be further adjusted within a zone as indicated by the Slider Position Indicator.

Using Valleylab™ Mode - Enabled Instruments



Using Instrument Buttons:

The **Valleylab™ mode** - enabled instrument can be activated as follows:

- **Cut** – press the yellow button on the instrument. The **Cut** box on the screen will illuminate yellow and a tone will sound for as long as the instrument is activated.
- **Valleylab™ Mode** – press the clear button on the instrument. The **Valleylab** box on the screen will illuminate white and a tone will sound for as long as the instrument is activated.
- **Coag** (Fulg or Spray) – press the blue button on the instrument. The **Coag** box on the screen will illuminate blue and a tone will sound for as long as the instrument is activated.

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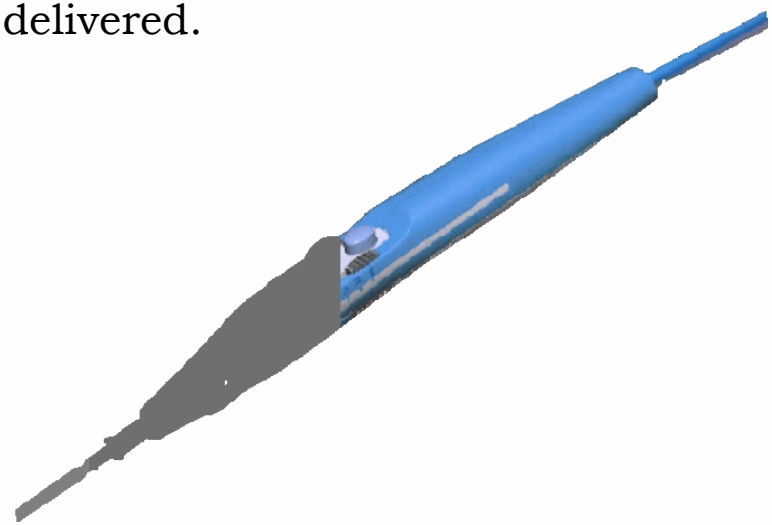
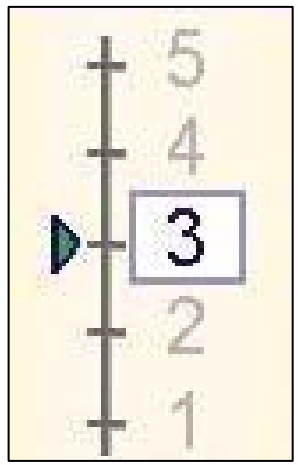
Using Instrument Slider:

- Adjust the power output within the selected power zone by adjusting the slider position on the instrument.
- The indicator on the Valleylab tab changes to match the slider position on the instrument.
- A double tone will sound when the slider position is changed. The tone increases in pitch as power settings are increased and decreases in pitch when the power decreases.
- The slider position cannot be changed when RF energy is being delivered.





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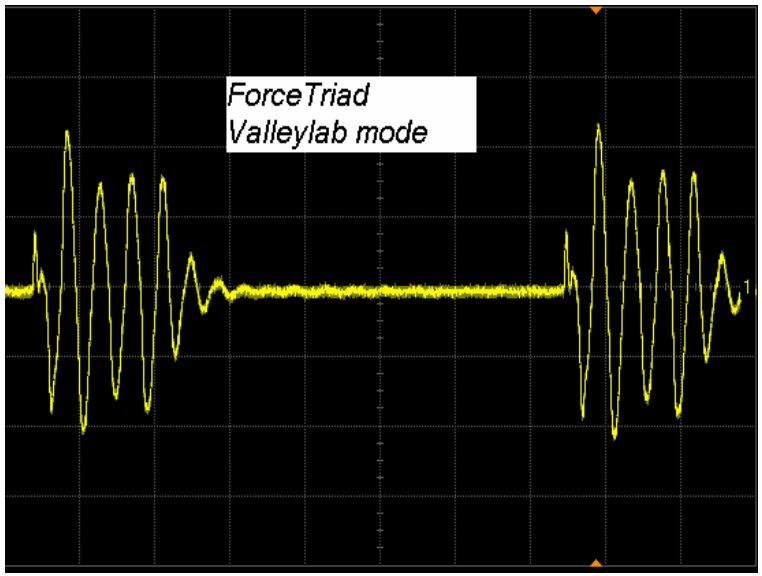
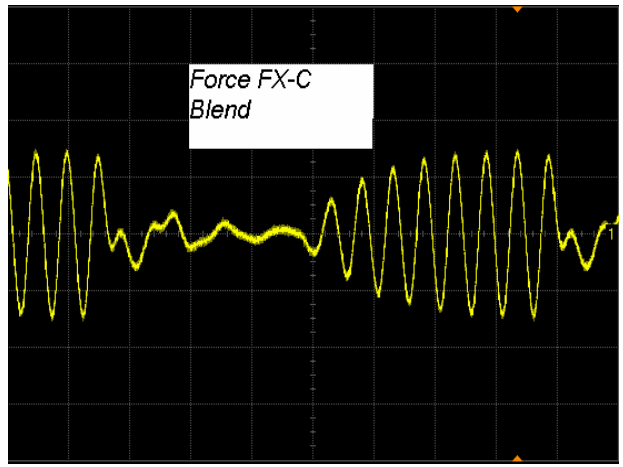
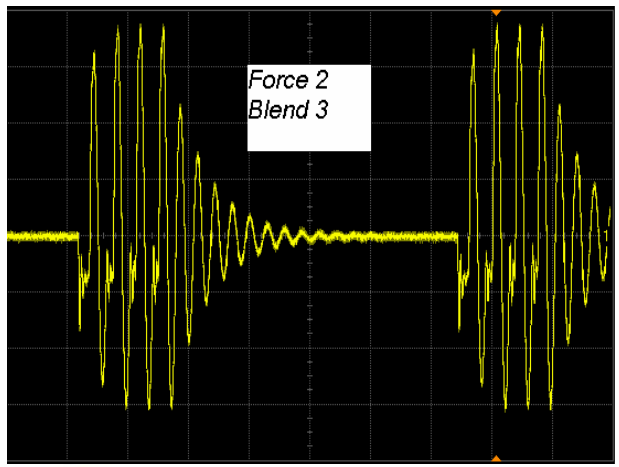
Valleylab™ Mode Waveforms







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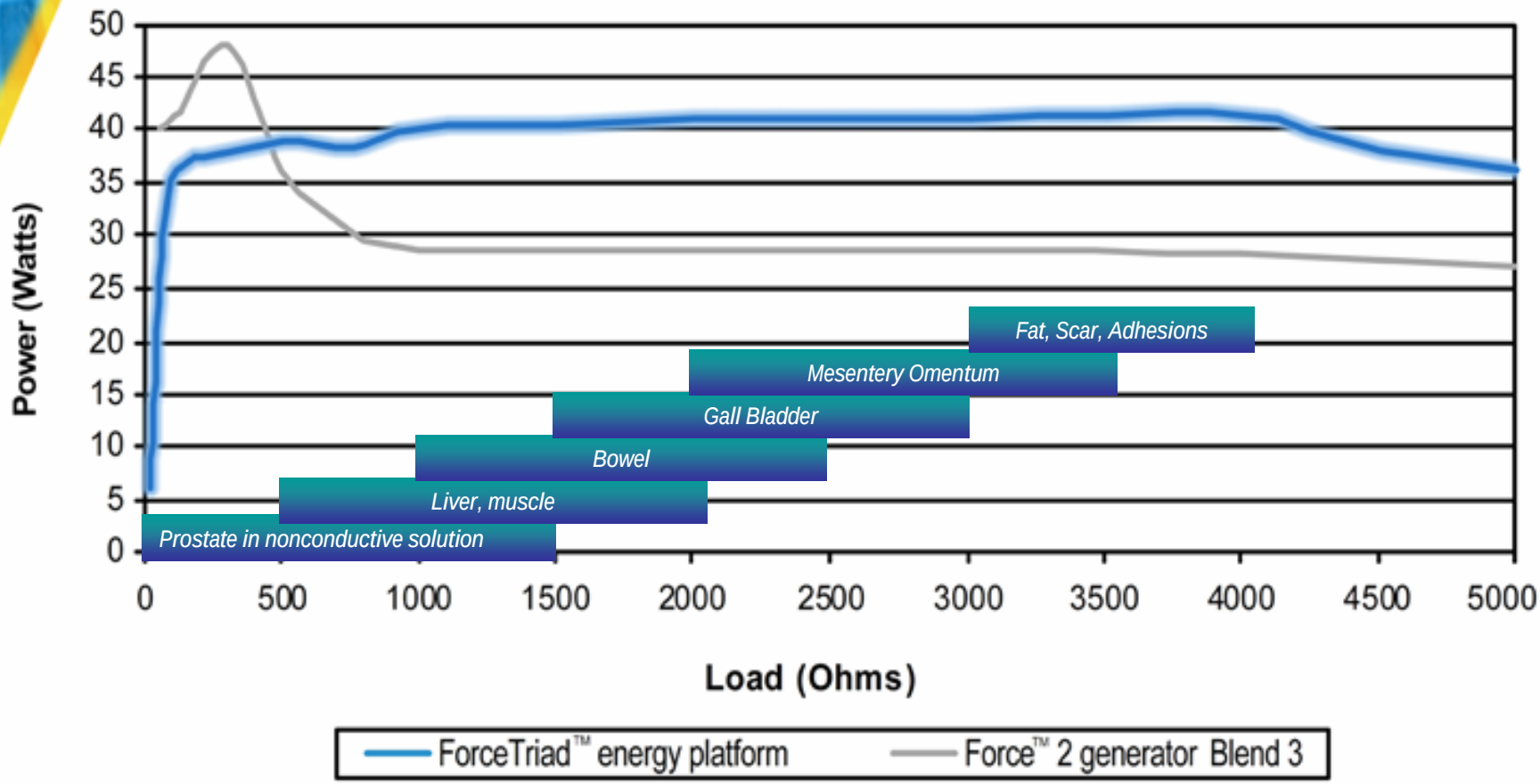
Valleylab™ Mode

ForceTriad™ energy platform vs. Force™ 2 generator at 40 watts



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Valleylab™ Mode Comparison

	Valleylab™ Mode	Force FX™-C Generator Blend	Force™ 2 Generator Blend 3
Duty cycle	**24%**	50%	25%
Frequency	**473 kHz**	390 kHz	510 kHz
TissueFect™ Sensing technology	**Yes**	Instant Response	No
Flat power curve	**Yes**	Yes	No
Power Efficiency Rating	**97**	98	78

FORCE TRIAD™ with TissueFect Sensing Technology

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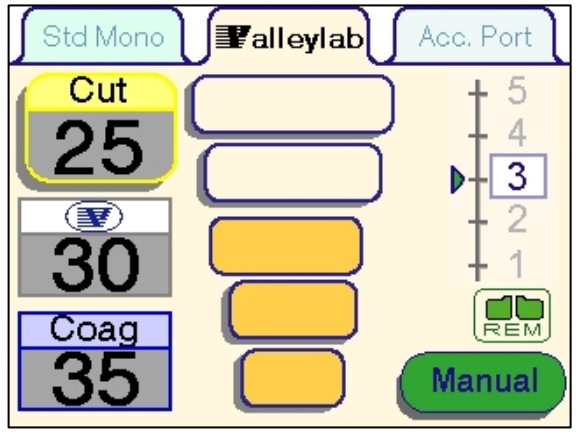
Manual Power Control:

The Manual mode allows the energy platform power output to be set to specific power setting. In Manual mode, the power level can only be set at the ForceTriad™ energy platform and the slider on the Valleylab electrosurgical instrument is disabled.



•Press the **green** **Manual** button on the Valleylab tab. The display changes to allow individual power adjustment for each of the three surgical modes.

• Press the **green** up or down arrows to adjust the power output level for the desired mode.

To return to control from the sterile field, touch the **Red** ☒ button on the screen.

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Bipolar Operation Overview

The ForceTriad™ energy platform produces three different bipolar modes of power output:

Low:

- Delivers precision and fine control over the amount of desiccation.

Standard:

- Conventional bipolar output at low voltage.

Macro (bipolar):

- May be used for bipolar cutting or rapid coagulation. Power remains constant over a wide range of tissue types.

Instrument Connection

- Connect a Bipolar electrosurgical instrument to the Bipolar instrument receptacle.

The ForceTriad™ energy platform will detect the instrument type and automatically display the Bipolar screen tab on the center touchscreen.

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Using Bipolar Instruments

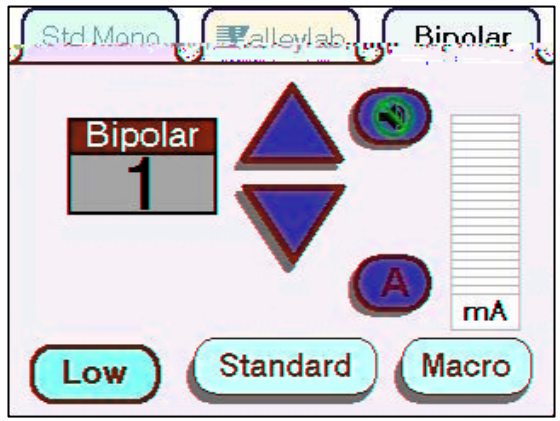
Power Mode:

Select the power output mode by touching the associated button at the bottom of the tab. The power output level in watts will display in the Bipolar box.

- **Low**
- **Standard**
- **Macro**

Power Output Level:

The power output level can be further adjusted by touching the **green** up and down arrows.



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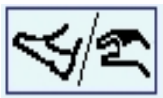
Using Bipolar Instruments

Activating Instrument:

The bipolar electrosurgical instrument can be activated as follows:

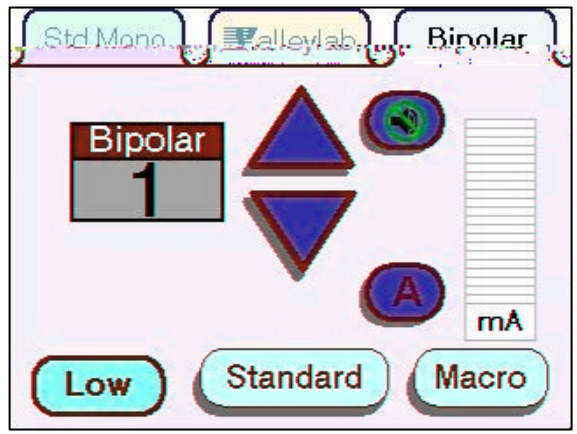
•Close the forceps firmly.

OR



•Step on the single-pedal bipolar footswitch.

An activation tone sounds and delivered current level displays on the Virtual Ammeter on the Bipolar tab. The Virtual Ammeter registers current between 1 and 1050 mA.



An audio tone sounds to indicate increase or decrease in current delivery. The ammeter tone may be muted by touching the speaker icon on the Bipolar tab.

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Autobipolar Function

The autobipolar feature senses tissue impedance between the two bipolar electrodes, and then uses the impedance information to automatically start or stop bipolar RF keying.

Activation of autobipolar keying can be set for:

- **Automatic** – activates automatically when correct tissue impedance is detected
- **Manual** – activates manually by closing the forceps or pressing the footpedal

For the autobipolar function to be available, it must be enabled in the **Setup Menu** (covered earlier in this course).

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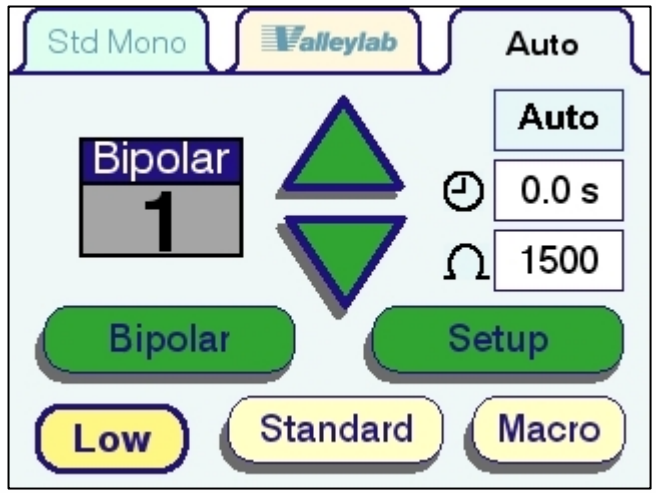
Step 1

Touch the **green** **"A"** button to activate autobipolar mode. The **Autobipolar** tab displays.

Step 2

Select the power output mode by touching the associated button at the bottom of the tab.



Step 3

Adjust the power output level as desired by touching the green up and down arrows.

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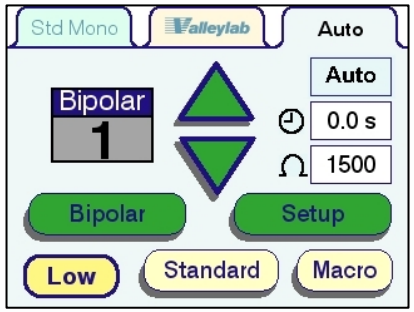
Step 4

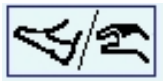
Touch the Setup button to change autobipolar activation parameters.



Step 5

• Touch the Auto button to set activation of autobipolar to begin when the set tissue impedance level is detected.

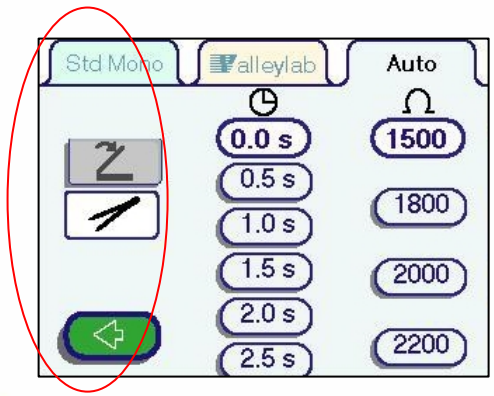
OR



• Touch the Footpedal/Forceps icon to set activation of autobipolar to depression of the footswitch or closing of the forceps.

Step 6

Touch the desired RF output delay time under the timer symbol.



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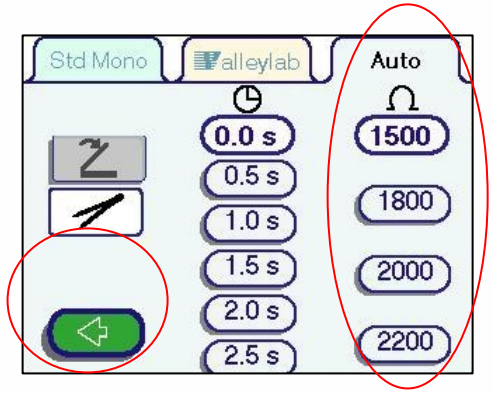
Step 7

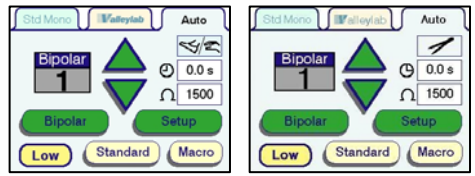
Touch the desired impedance level at which RF energy will be discontinued.



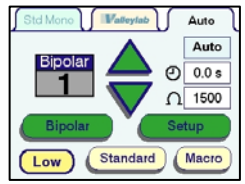
Step 8

Touch the **green** arrow to return to the previous display.

If activation is set to **Manual**, closing the forceps tines or stepping on the footswitch will activate bipolar.



In **Auto mode**, autobipolar will be activated when correct tissue impedance is detected.



Step 9

Return to Bipolar functionality by touching the **green Bipolar** button.

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LigaSure™ Operation Overview

The LigaSure™ tissue fusion mode can be used on arteries, veins, and lymphatics up to and including 7mm in diameter and tissue bundles.

This system provides precise energy delivery and electrode pressure to tissue for a controlled time period to achieve a complete and permanent fusion of the tissue and vessel lumen. The system has been designed to minimize sticking, charring and thermal spread to adjacent tissue.

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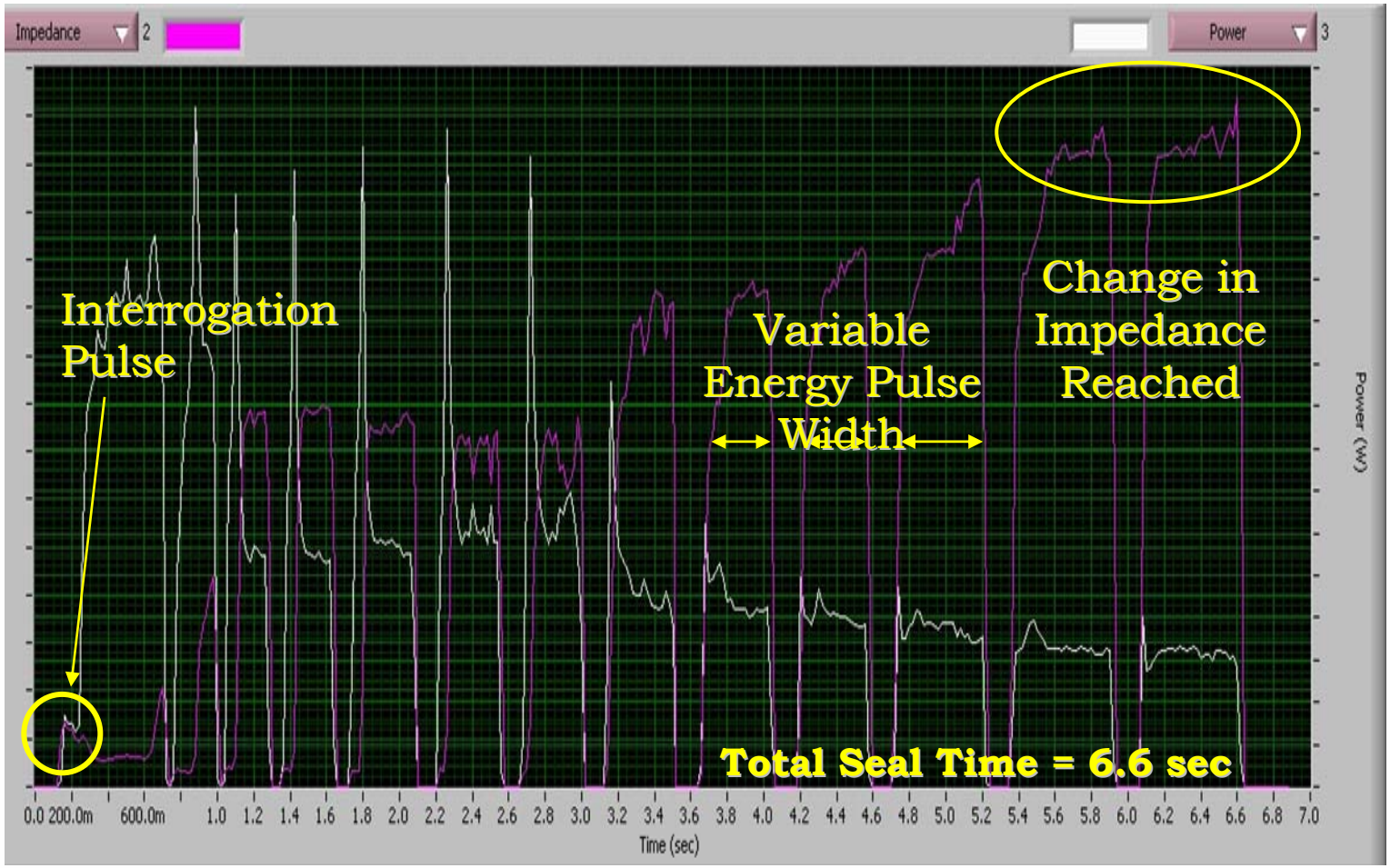
Current Seal Cycle


Impedance
2
Power
3
Interrogation Pulse
Variable Energy Pulse Width
Change in Impedance Reached
Total Seal Time = 6.6 sec
Power (W)
0.0 200.0m 600.0m 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 3.8 4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6 5.8 6.0 6.2 6.4 6.6 6.8 7.0
Time (sec)

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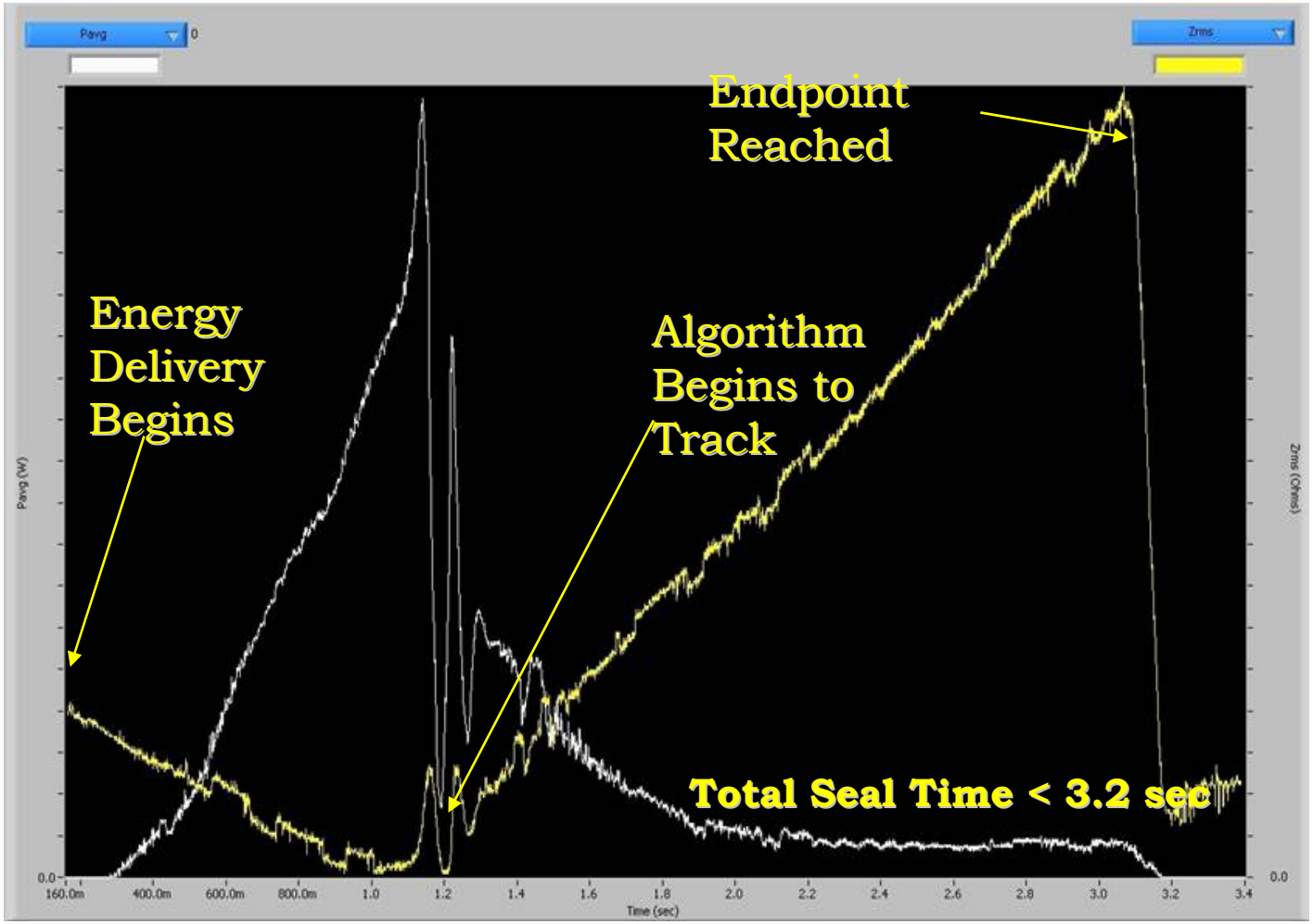
New LigaSure™ Tissue Fusion Cycle



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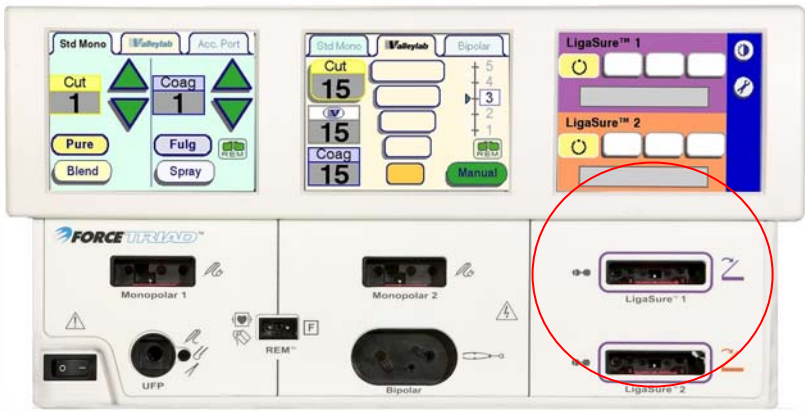
Instrument Connection

Only Valleylab LigaSure™ instruments can be used with the system. Two LigaSure™ instruments can be connected to the ForceTriad™ system, but only one instrument can be activated at a time.

Connect a LigaSure™ instrument to the LigaSure™ 1 or LigaSure™ 2 receptacle on the front panel of the ForceTriad™ energy platform. If you are using a footswitching LigaSure™ instrument, confirm that the instrument is connected to the receptacle with the corresponding connected footswitch.

- LigaSure™ 1 with **purple** icon footswitch for purple footswitch
- LigaSure™ 2 with **orange** icon footswitch for orange footswitch



The energy platform detects the instrument type and sets the appropriate bar setting in the display. If the LigaSure™ instrument is not recognized, an "Invalid Instrument" message displays.

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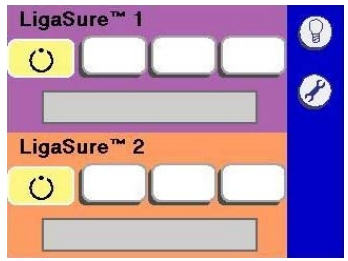
Using LigaSure™ Instruments

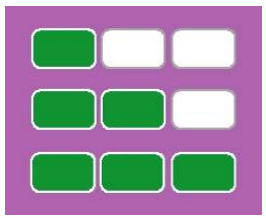
LigaSure™ Touchscreen:

The upper, **purple** section of the LigaSure™ touchscreen controls the instrument connected to the LigaSure™ 1 receptacle; the lower, **orange** section controls any instrument connected to the LigaSure™ 2 receptacle.



Energy Setting:

The ForceTriad™ energy platform has been designed so that all existing LigaSure™ instruments perform most effectively at an energy setting of **two green bars**.



- One bar may be used for thin or small tissue bundles, or small isolated vasculature.
- Three bars may be used if you continue to receive endpoint-not-reached alerts.

Touch one of the three bars to set the energy setting for the associated LigaSure™ instrument.

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Activating Instrument:

The LigaSure™ instrument can be activated as follows:

- Pressing and holding the activation button on the instrument, or
- Stepping on and holding the footswitch pedal.
- The Status bar on the screen illuminates **blue** and a tone will sound for as long as the instrument is activated.

When the end tone is heard, release the activation button or the footswitch pedal.

Alert Conditions

When an alert condition occurs, four pulsed tones will sound, and the touchscreen displays an alert message that instructs the user on the corrective actions to take. The energy will stop being delivered to the tissue as soon as the pulsed tone sounds. Release the activation button or footswitch and follow the corrective actions.

The two alert conditions are:

- **Check instrument**
- **Endpoint not reached**

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Check instrument

Condition 1:

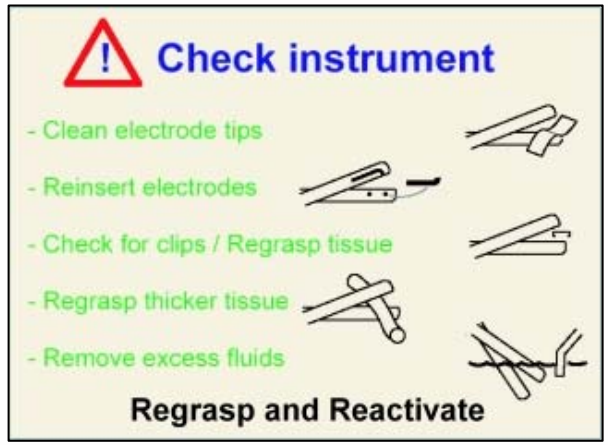
Electrode tips are dirty

- Use a wet 4x4 to clean surfaces and edges of instrument jaws
- Regrasp the tissue and reactivate the energy

Condition 2:

Electrodes may have been dislodged

- Re-insert electrodes
- Regrasp the tissue and reactivate the energy



Condition 3:

Grasping foreign object

- Avoid grasping objects such as staples, clips or encapsulated sutures in the instrument jaws
- Regrasp the tissue and reactivate the energy

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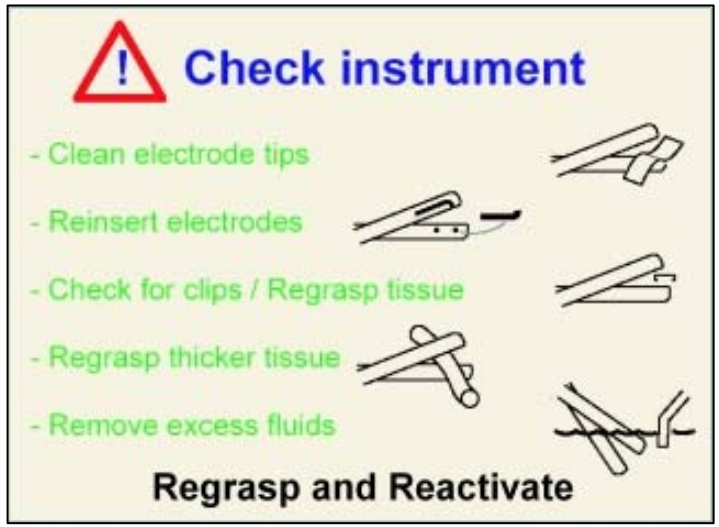
Condition 4:

Thin tissue within the jaws

- Regrasp thicker tissue – Open the jaws to confirm that a sufficient amount of tissue is inside the jaws. If necessary, increase the amount of tissue
- Reactivate the energy



Condition 5:

Pooled fluids around instrument tip

- Minimize fluids and remove excess fluids
- Regrasp the tissue and reactivate the energy

Condition 6:

The endpoint has not been reached

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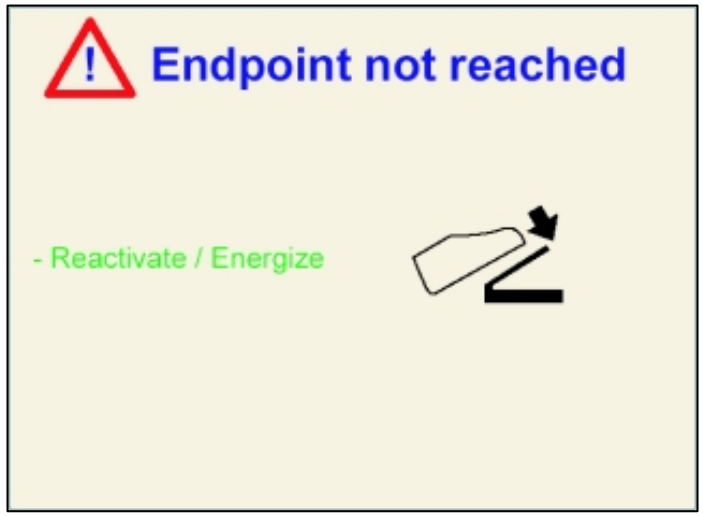
Condition 6:

The endpoint has not been reached

•The system needs more time and energy to complete the fusion
•Reactivate the fusion cycle without removing or repositioning the instrument
•The system needs more time and energy to complete the fusion

•Reactivate the fusion cycle without removing or repositioning the instrument



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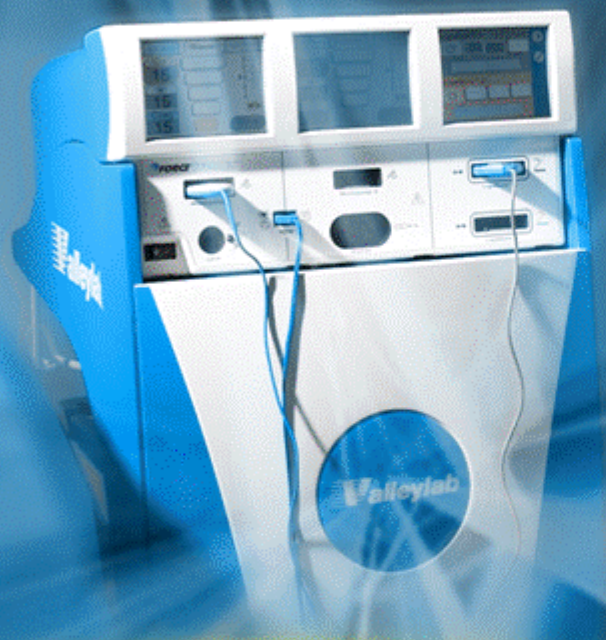

Questions?

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